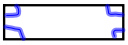
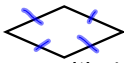
8-4 Properties of Rectangles, Rhombuses and Squares

Rectangle--parallelogram with 4 right angles



Rhombus--parallelogram with 4 congruent sides



Square--parallelogram with 4 right angles and 4 congruent sides

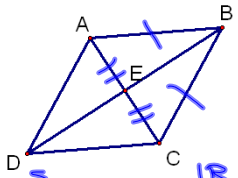
Corollaries

Rhombus Corollary--A quadrilateral is a rhombus iff it has 4 congruent sides.

Rectangle Corollary--A quadrilateral is a rectangle iff it has 4 right angles.

Square Corollary--A quadrilateral is a square iff it is a rhombus and a rectangle.

iff ⇒ biconditional thm & converse are both true



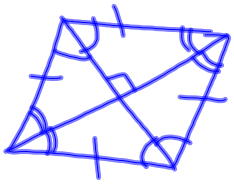
Rhombus ABCD

$\text{Prove: } \overline{AC} \perp \overline{DB}$

S	R
① Rhombus ABCD	① Given
② $\overline{AB} \cong \overline{BC}$	② def of Rhombus
③ $\overline{AE} \cong \overline{EC}$	③ diag. of □ bisect each oth
④ $\overline{BE}$ is ⊥ bis of $\overline{AC}$	④ Conv. of ⊥ Bis thm
⑤ $\overline{AC} \perp \overline{BD}$	⑤ def of ⊥ Bis

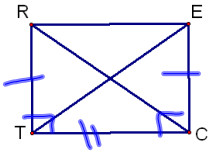
Theorem 8.11--A parallelogram is a rhombus iff its diagonals are perpendicular

Theorem 8.12--A parallelogram is a rhombus iff each diagonal of a rhombus bisects a pair of opposite angles



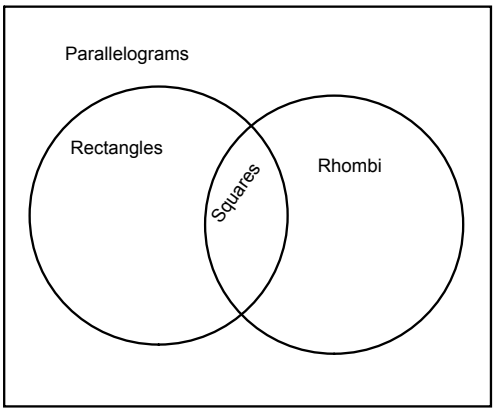
Given: Rectangle RECT

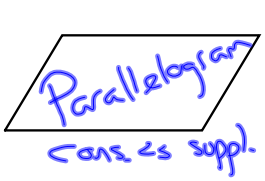
Prove: $\overline{RC} \cong \overline{TE}$ $\triangle RTC \cong \triangle ECT$



S	R
① ~	① Given
② $\overline{RT} \cong \overline{EC}$	② Opp sides □ are ≅
③ ∠RTC and ∠ECT are Rt ∠s	③ def of Rect
④ ∠RTC ≅ ∠ECT	④ Rt ∠s ≅
⑤ $\overline{TC} \cong \overline{TC}$	⑤ Refl.
⑥ $\triangle RTC \cong \triangle ECT$	⑥ SAS
⑦ $\overline{RC} \cong \overline{TE}$	⑦ CPCTC

Theorem 8.13--A parallelogram is a rectangle iff its diagonals are congruent.

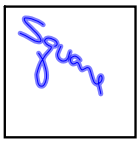




opp sides ≅
opp sides ∥
diagonals bisect each other
cons ∠s suppl.
opp ∠s ≅

5 ▱ facts
4 Rt ∠s
diagonals ≅

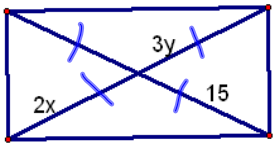
- 5 ▱ facts
- 4 ≅ sides
- diagonals ⊥
- diagonals bisect the ∠s



- ▱
- Rect
- Rhombus

Examples:

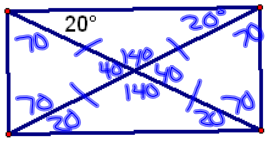
Given the rectangle below, solve for x and y.



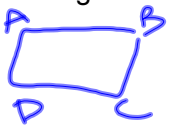
$2x = 15$ $3y = 15$

$x = 7.5$ $y = 5$

Given the rectangle below, fill in all of the angles.



Is ABCD a rectangle?
A(-2, 1)
B(4, 3)
C(5, 0)
D(-1, -2)



We don't know it is a ▱
We must show it.

M $\overline{AC}$ $\left(\frac{3}{2}, \frac{1}{2}\right)$ $AC = \sqrt{7^2 + (-1)^2} = \sqrt{50}$

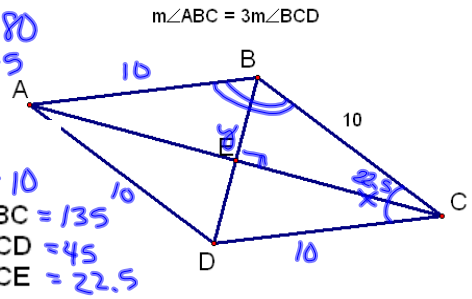
M $\overline{BD}$ $\left(\frac{3}{2}, \frac{1}{2}\right)$ $BD = \sqrt{5^2 + 5^2} = \sqrt{50}$

ABCD is a ▱ (diagonals bisect each other) w/ ≅ diagonals, so it is a rectangle.

Rhombus ABCD

$4x = 180$
$x = 45$

m∠ABC = 3m∠BCD

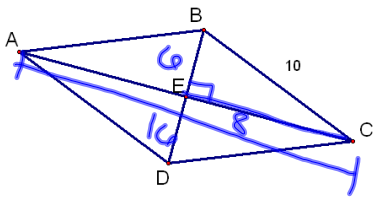


Find
AB = 10
m∠ABC = 135
m∠BCD = 45
m∠BCE = 22.5

*Find BE = 3.8

$\sin 22.5 = \frac{y}{10}$

Rhombus ABCD
AC = 16



Find BD. = 12

Is ▱ABCD a rectangle, rhombus, or a square. List all that apply.

diagonals ≅ (Rect)
diagonals ⊥ (Rhom)
→ Rhom (Sq)

1. A(-7, 3) B (-2, 3) C(1, 7) D (-4, 7)

$\overline{AC} = m = \frac{7-3}{1--7} = \frac{4}{8} = \frac{1}{2}$

diagonals ⊥ Rhombus

$\overline{BD} \quad m = \frac{2-3}{-4--2} = \frac{4}{-2} = -2$

$AC = \sqrt{8^2 + 4^2} = \sqrt{80}$
$BD = \sqrt{\quad} \quad \sqrt{20}$

Is ▱ABCD a rectangle, rhombus, or a square. List all that apply.

2. A(-2, -1) B(-4, 3) C(1, 5) D(3, 1)

HW
p537-538
#s 1-14, 19-24, 32-49
50 & 51 (don't find perimeter)

This is not as much as it seems.